

A.S.E. Source at 1550nm for IFOG Applications

Quarterly Progress Report

Period: 9/6/97 to 12/5/97

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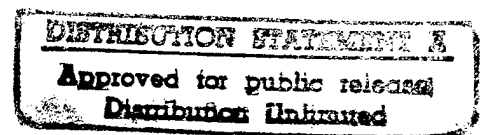
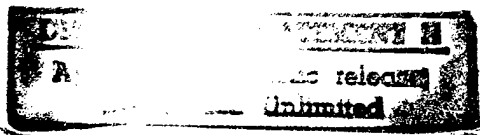
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1. We performed annealing studies for the Al_2O_3 guides, and we have identified the best annealing temperatures in terms of lifetimes and luminescence. For example a 0.1% Er doped film is best annealed at 500 C for a period of 1 hour in an oxygen ambient atmosphere. The lifetimes measured with 0.1% Er is around 4 ms, which is a factor of two less than as seen in fiber for a tenth of that doping level but our previous measurements indicate increased gain.. Measurements on the Al_2O_3 guides showed 20% improvement of lifetime achieved by annealing. Erbium and Ytterbium codoped films had one half the lifetimes of those doped with Erbium alone. (See attached figures of lifetime data.)

2. Rutherford Backscattering (RBS) measurements on the Al_2O_3 guides showed the estimated doping profiles desired in the guides were achieved. The films estimated to be doped at 0.1% Er showed 0.08% Er in the RBS data.

3. Dr. Stadler has sputtered in-house amorphous Al_2O_3 film with excellent morphology. Currently these films are been doped with Erbium, waveguides fabricated, and being tested.

4. Discussions with Dr. Onstott of 3M suggested that the introduction of La in the films may increase the lifetimes with higher Er doping. We have obtained films with La doping in the range of 1 to 2%, and the preliminary tests for a 0.1% Er doped Al_2O_3 guide shows an increase of the lifetime to

5 ms, but with the luminescence intensity reduced about by less an order of magnitude. Al_2O_3 core fibers highly doped with Er show higher with La codoping, but also require P codoping. It is unlikely that P codoping can be included in our guides.

5. We are investigating a program for calculating losses from waveguides bends so that we can design a long waveguide for pump absorption measurements.

6. A paper was submitted to **Integrated Photonics Research' 98** based on previous results was entitled, Luminescence and Gain in Co-Sputtered Al_2O_3 Erbium-Doped Waveguides, and has been accepted for presentation.
(Copy attached)